

Dan Kennel Villanov
1838773

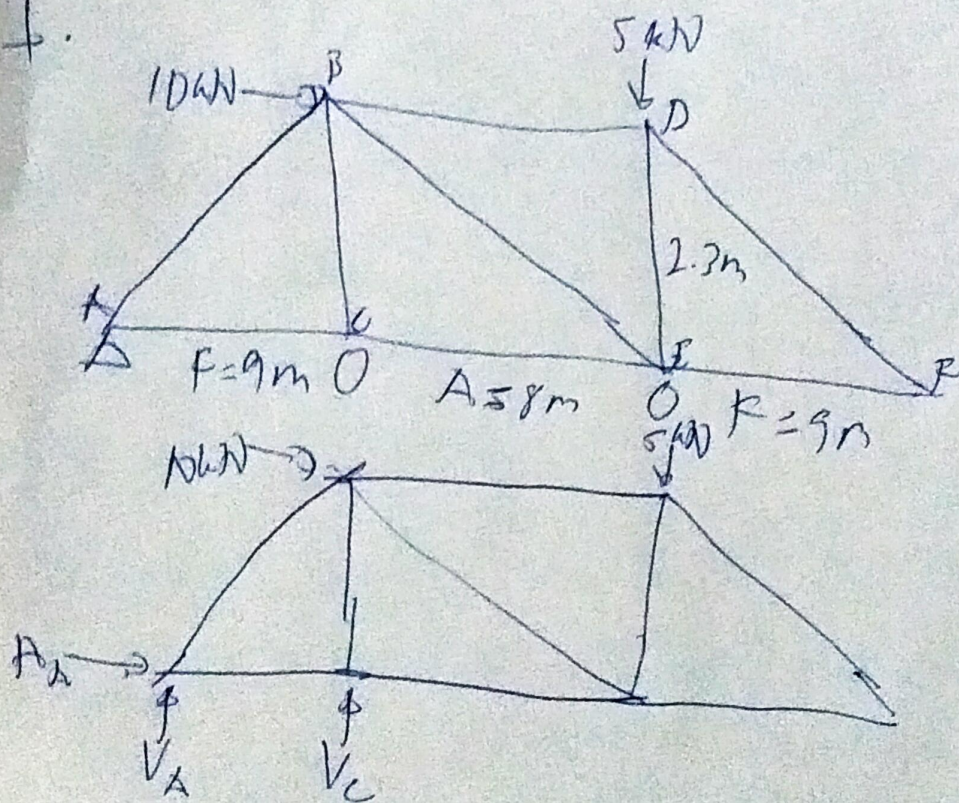
CK5722L Log Quiz 1

11 ABCDEF A=8, B=3, C=8, D=7, E=7
11 8 3 8 7 7 9 F=9

Determine the reactions and member forces of the given truss below:

2.B=2.3

I.

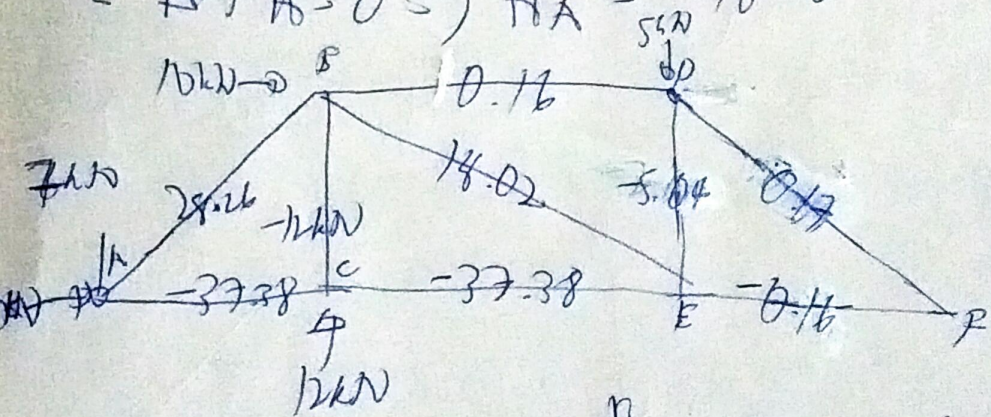


$$\begin{aligned} \sum M_A &= 0! + V_C (9m) - (10kN)(2.3m) \\ \Rightarrow 54kN(17m) &= 0 \Rightarrow V_C = 12kN \end{aligned}$$

$$\Sigma F_{V=0}: V_A + V_C - 5 \text{ kN} = 0$$

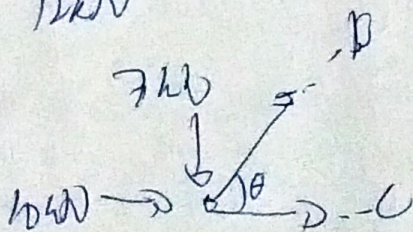
$$V_x = -72 \text{ kV}$$

$[R_A = 0] \Rightarrow H_A = -10 \text{ kN}$



572.

$$\theta = \sin^{-1}\left(\frac{2.3}{9}\right) = 14.39^\circ$$

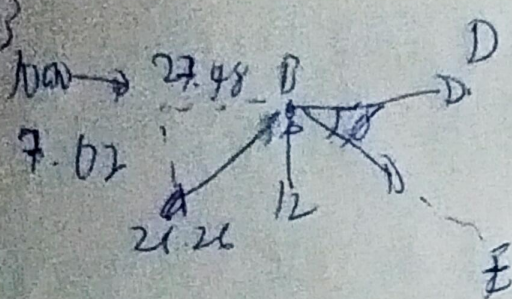


$$\Sigma F_y = 0 \quad -72N + \sin(19.34^\circ) (505) + AB = 0 \quad AB = 28.41N$$

$$\Sigma F_x = 0 \quad 1040N + AB \cos(14.34^\circ) + AL = 0$$

$$AL = -37.384N = 37.384N \quad (\leftarrow)$$

ST-B



$$\phi = \tan^{-1}\left(\frac{2.3}{8}\right) = 16.04^\circ$$

$$\sum F_y = 0: -7.02 + BE \sin(16.04^\circ) = 0$$

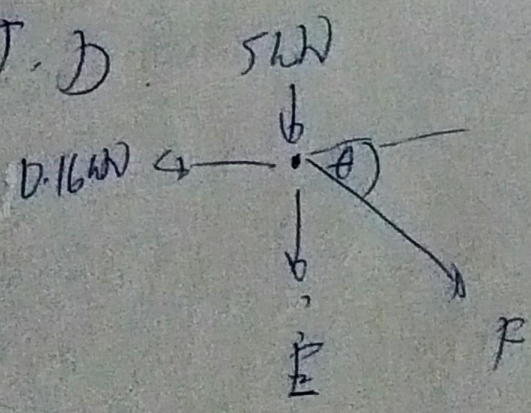
$$BE = 18.02 \text{ kN}$$

$$\sum \mathcal{M}_B = 0:$$

$$-27.48 + BE \cos(16.04^\circ) + BD + 0.16 \text{ kN} = 0$$

$$BD = 0.16 \text{ kN}$$

ST-D



$$\theta = 14.74^\circ$$

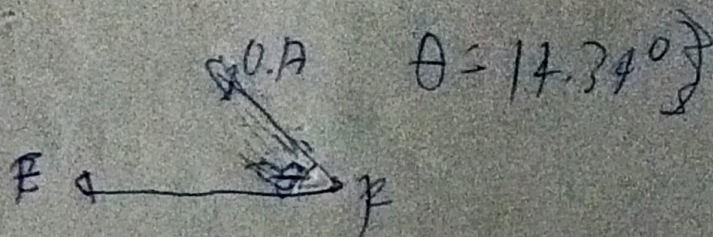
$$\sum \mathcal{M}_D = 0: -0.16 + DF \cos(14.74^\circ) = 0$$

$$DF = 0.17$$

$$\sum F_y = 0: -5 - DE - DF \sin(14.74^\circ) = 0$$

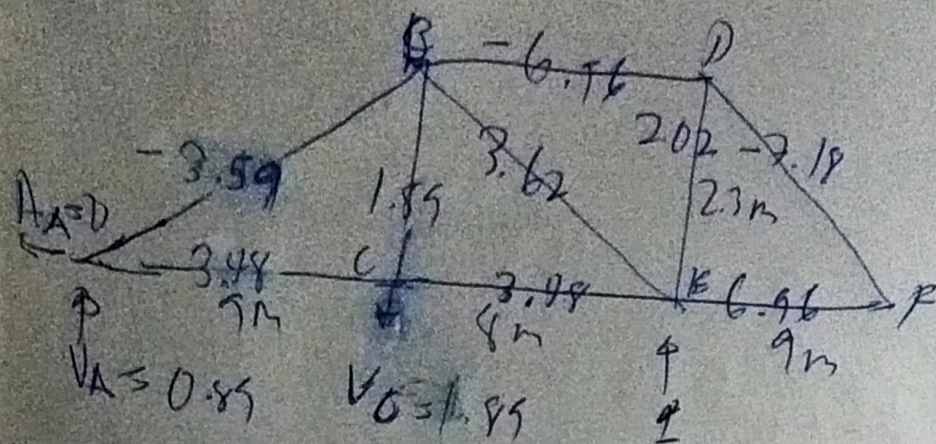
$$DE = -5.04$$

PT.F

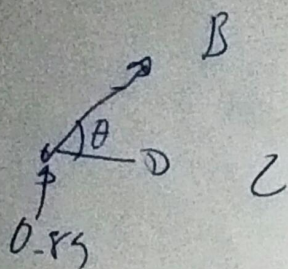


$$\Sigma \tau_{\alpha=0} : -FP = 0.17 \cos(17.34^\circ) = 0$$

$$FP = -0.16 \text{ W}$$



$\sum M_A = 0: -V_C(9) + 3(17) = 0 \Rightarrow V_C = 1.85$
 $\sum F_x = 0:$

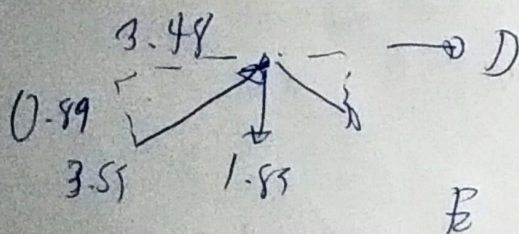


$\theta = 14.32^\circ$

$\sum F_y = 0: 0.85 + AB \sin \theta = 0 \Rightarrow AB = -3.55$

$\sum F_x = 0: AB \cos \theta + AC = 0 \Rightarrow AC = 3.48$

$\sum F_B:$



$\phi = 16.04^\circ$

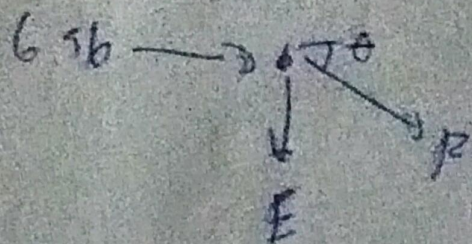
$\sum F_y = 0: 0.85 - 1.85 - BE \sin \phi = 0$

$BE = 3.62$

$\sum F_x = 0: 3.48 + BE \cos \phi + BD = 0$

$BD = -6.96$

ΣT D:



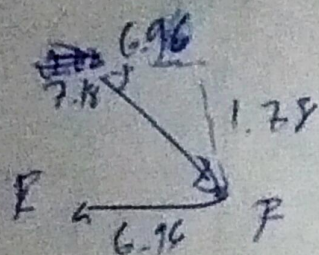
~~ΣF_x = 0~~: ΣF_x = 0: $6.96 + DP \cos \theta = 0$

$$DP = -7.18$$

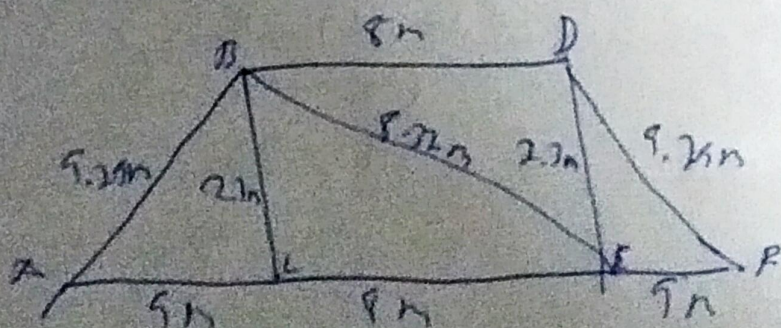
ΣF_y = 0: $-DP \sin \theta - DE = 0$

$$DE = 2.02$$

ΣT F:



$$FE = 6.96$$



For member CD

$$V_E = - \frac{\left(\frac{5PL}{AE} \right)}{\left(\frac{5hL}{AE} \right)} = 1.54 \text{ kN}$$

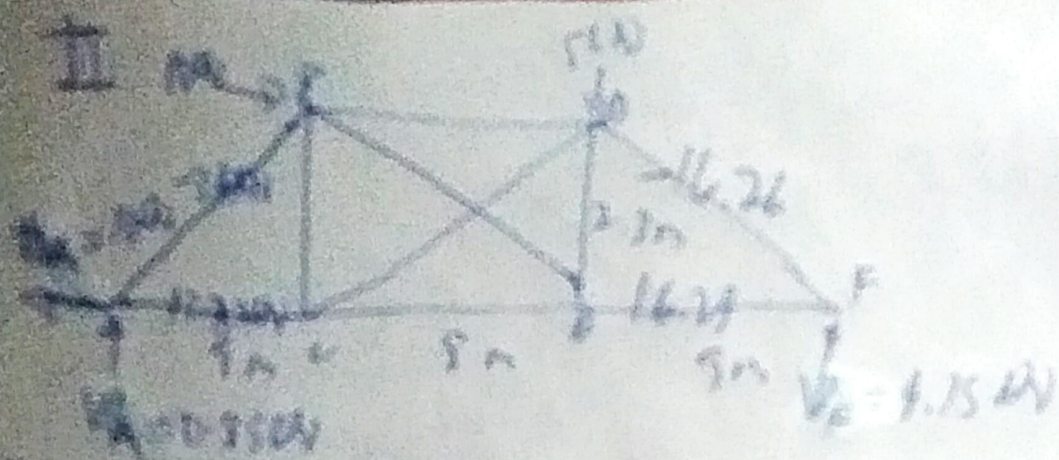
Member	member forces
AD	22.70 kN (T)
AL	31.99 kN (C)
DL	7.07 kN (C)
RD	10.62 kN (C)
BE	23.63 kN (T)
CE	31.55 kN (C)
DE	1.51 kN (C)
DF	10.95 kN (C)
EF	10.62 kN (C)

$$H_A = 10 \text{ kN}$$

$$V_A = 7 \text{ kN}$$

$$V_C = 12 \text{ kN}$$

$$V_E = 1.54 \text{ kN}$$

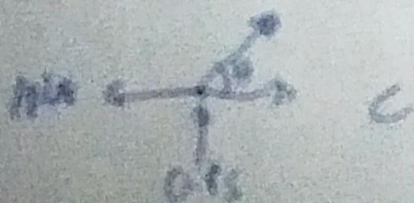


$$\sum M_A = 0: V_F (26\text{m}) - 5\text{kN}(10\text{m}) - 10\text{kN}(23\text{m}) = 0$$

$$V_F = 4.15 \text{ kN}$$

$$\sum F_y = 0: V_A - 5\text{kN} + V_F = 0 \Rightarrow V_A = 0.55 \text{ kN}$$

$$\sum F_x = 0: 5\text{kN} - AB \sin \theta = 0 \Rightarrow \theta = 14.74^\circ$$



$$\sum F_y = 0: 0.55 + AB \sin \theta = 0$$

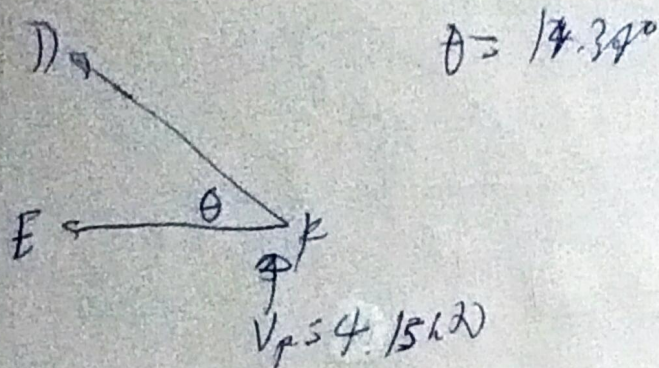
$$AB = -2.93 \text{ kN}$$

$$\sum F_x = 0:$$

$$-10\text{kN} + DC + AB \cos \theta = 0$$

$$DC = 13.72 \text{ kN}$$

ST. P.

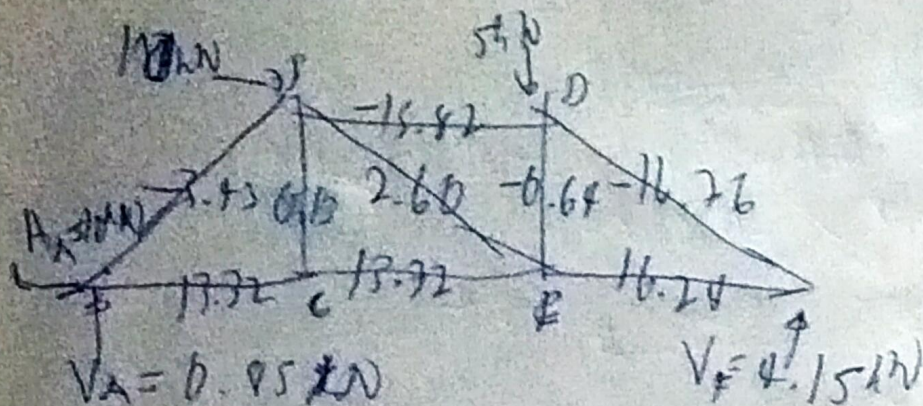


$$\sum F_y = 0: 4.15 + DP \sin(14.34) = 0$$

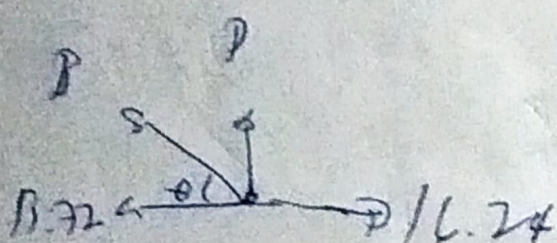
$$DP = -16.76 \text{ kN}$$

$$\sum F_x = 0: -DP \cos(14.34) + EF = 0$$

$$EF = 16.24 \text{ kN}$$



JT. E:



$$\theta = 14.34^\circ$$

$$\sum F_y = 0$$

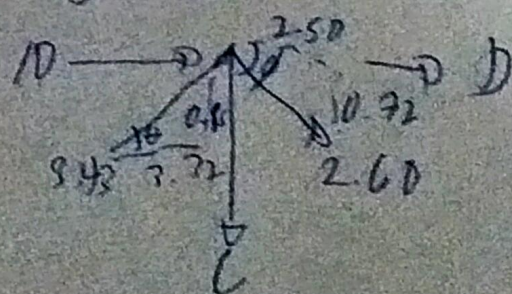
$$\sum F_x = 0: -DE \cos \theta - 13.72 + 16.24 = 0$$

$$DE = 2.60$$

$$\sum F_y = 0: DE \sin \theta + DE = 0$$

$$DE = -0.64$$

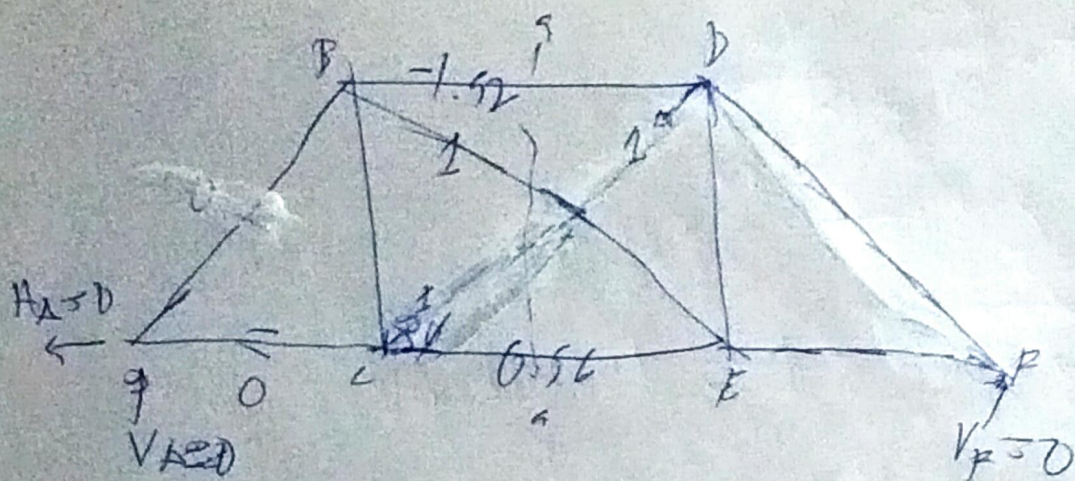
JT. B:



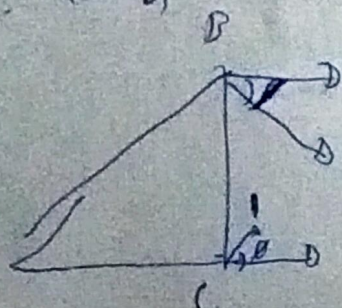
$$\theta = 16.64^\circ$$

$$\sum F_x = 0: 10 + 3.32 + 2.50 + BD - D = 0 \Rightarrow BD = -8.82$$

$$\sum F_y = 0: 0.95 - 0.82 - BD = 0 \Rightarrow BD = 0.13$$



for $\phi = 16.07^\circ$



$$\phi = 16.07^\circ$$

$$\sum M_B = 0 \Rightarrow 1(\cos \phi) + \frac{(2.3)}{2} \frac{(2.3)}{2} (\frac{4}{5}) = 0$$

$$\cos \phi = 0.96$$

$$\sum F_y = 0 \Rightarrow + \sin \phi - BE \sin \phi = 0$$

$$\Rightarrow BE = 1 \quad BD + \cos \phi + \cos \phi = 0$$

$$\sum F_x = 0 \Rightarrow \frac{BD}{2}$$

$$BD = -1.52$$